The association between Musculoskeletal Pain and Psychological Distress among five immigrant groups: Results of a cross-sectional study in Oslo, Norway

Steve Diaz French
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This Thesis was written under the supervision of

Lars Lien MD, Ph.D.
Associate Professor
Institute of General Practice and Community Medicine, Section for Preventive Medicine and Epidemiology (FEPI) University of Oslo

Hein Stigum, Ph.D.
Senior Scientist
Norwegian Institute of Public Health

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List of Abbreviations

CAD	- Coronary Arterial Disease
CI	- Confidence Interval
ESEP	- Experience of Serious Economic Problem
GP(s)	- General Practitioner (s)
NPA	- No Physical Activity (PA)
HSCL-10	- Hopkins Symptom Checklist
IASP	- International Association for the Study of Pain
MSP	- Musculoskeletal Pain
MSMP	- Moderate-Severe Musculoskeletal Pain
N	- Number (count)
NLP	- None or little pain
OR(s)	- Odds Ratio(s)
SD	- Standard Deviation
/wk	- Per week

Abstract

Objective: Even with an increasing immigrant population in Norway, there are still a limited number of studies among the group. Chronic musculoskeletal and psychiatric disorders frequently occur and there is a need to establish the magnitude of prevalence and the strength of association between the two chronic disorders in a local context.

Methods: Cross-sectional data from the Oslo Immigrant Health Study in 2002 were analyzed. Questionnaires were sent to age cohorts, between 20 and 60 years old, among immigrants born in Sri Lanka, Iran, Turkey, Pakistan, and Vietnam.

Results: The results show that neck and shoulders are the most common sites of pain. Women have a higher prevalence of moderate-severe musculoskeletal pain than men do in all five areas of the body. Psychological distress was associated as the strongest predictor of musculoskeletal pain after the adjustment for gender, age, pre-migration factors and others variables in the logistic regression analyses among all five immigrant groups.

Conclusion: Findings from this study support previous studies of the prevalence of musculoskeletal pain and the association between musculoskeletal pain and psychological distress among the minorities in their host country. This also presents the possibility of improving the efforts of the Norwegian health system in providing relevant treatment services for the immigrant population.

1

Introduction

The immigrant population has increased in Norway[1] over the last decade. Like any other country, Norway has had its fair share of healthcare dilemma related to her increasingly multi-cultural population. For instance, an increasing immigrant population has changed the healthcare landscape of Norway. As an example, there has been an increase in the number of South-Asian population and the increased rate of diabetes mellitus[2].

However, one knows very little about the health of the new residents of Norway especially with respect to health conditions that may be associated with ethnic origin (1). Successful planning and management of chronic diseases like chronic pain or mental illness requires knowledge regarding the magnitude of these illnesses. This thesis will be the first to discuss the differences in musculoskeletal pain and its association with psychological distress among five immigrant groups (age 20-60) living in Oslo, Norway.

[1] http://www.ssb.no/english/subjects/02/03/innvfram_en/
[2] http://www.fhi.no/eway/default.aspx?pid=238&trg=MainLeft_5895&MainArea_5811=5895:0:15,4675:1:0:0:::0:0&MainLeft_5895=5825:74058::1:5896:1:::0:0

1.1 Theoretical Background

Pain is a subjective and complex experience that is unique to each individual. The complexity of a pain experience involves several dimensions (Fig. 1) (2).

According to the International Association for the study of Pain (IASP), pain is defined as "*an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage*" (3). This definition explains that pain is a private experience and therefore complex.

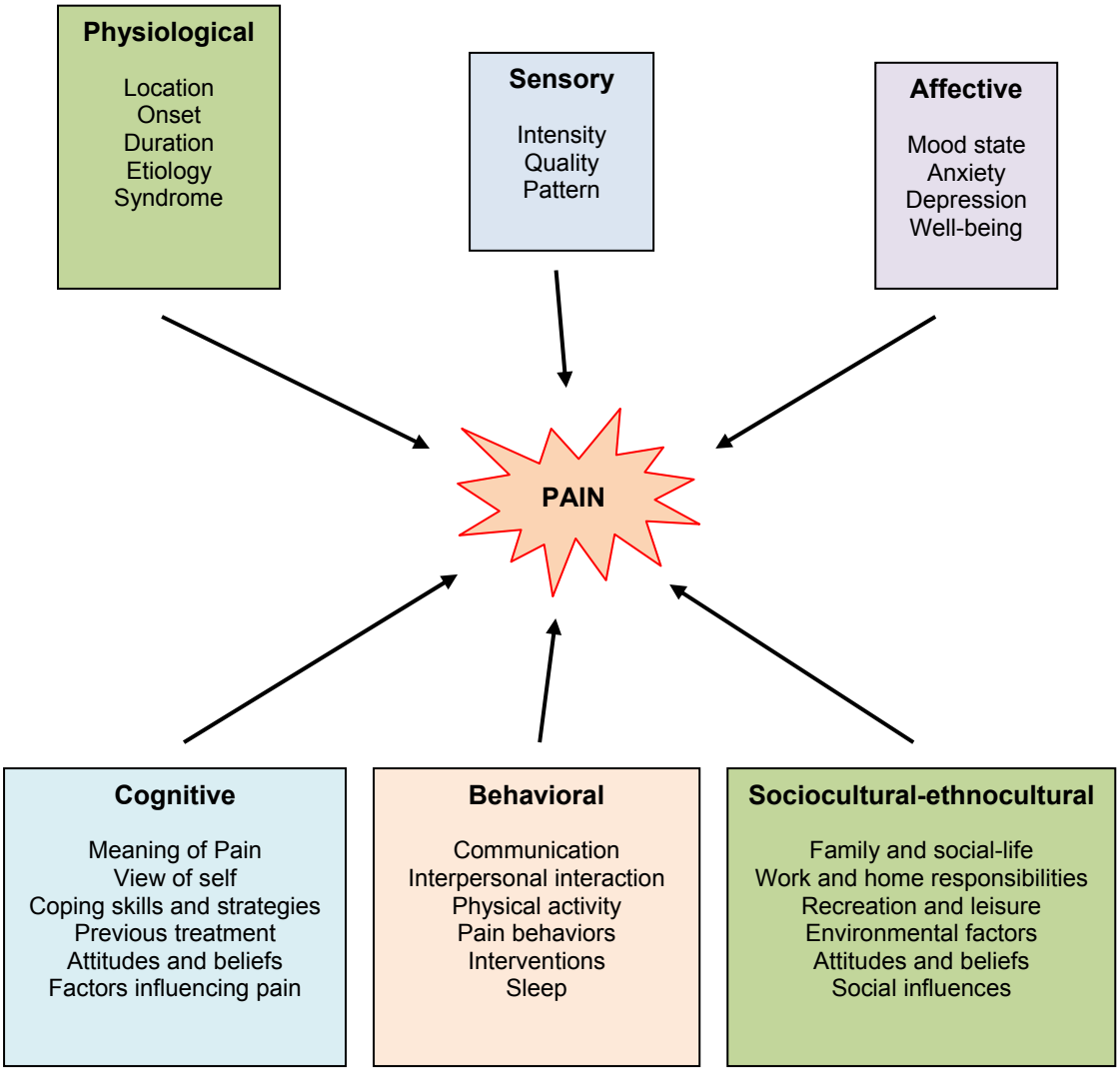
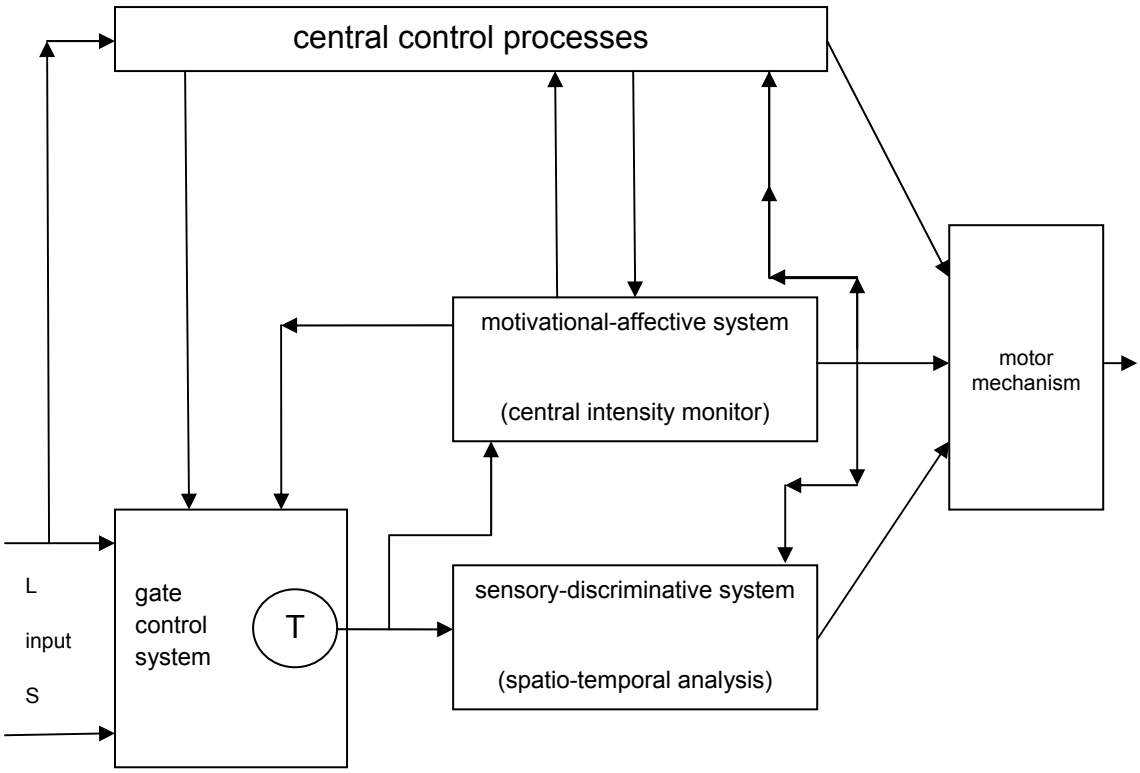


Figure 1: The Dimensions of Pain. (D.J. Magee: Orthopedic Physical Assessment, 4th Edition. Philadelphia, Saunders, 2002, p.4.)

Melzack and Wall pioneered the Gate Control Theory (Fig. 2) to emphasize a more incorporated view of the central pain processing at the spinal cord and cerebral levels (4;5). The theory explains the spinal cord as both a passive channel for pain diffusion and as an active modulator of pain signals. The spinal cord can also block nociceptive information to be assessed by the central nervous system (brain). The theory expanded from a purely sensory event to a more complex experience which emphasizes motivational, affective and cognitive aspects of pain experience (3). The sensory, affective, and motivational aspects of pain could activate neural pathways as the effect of pain experience.

Moreover, pain can also be influenced by descending inhibitions from cortical structures. The behavioural-induced reduction of pain is the effect of the descending modulation of the gate that theoretically could block the nociceptive signals at the dorsal horn. On the other hand, pain could potentially increase due to a psychological process, like depression, that can facilitate the ‘opening of the gate’ mechanism at the dorsal horn. Thus, pain experience is influenced by affective (emotional and motivational), subjective (sensory) and evaluative (cognitive) components. Simple reflexes which are usually thought to be spinal in nature are now known to be influenced by cognitive processes (5). For example, when we know the cup we use for our coffee is very expensive, and we pick this cup up while it is very hot, we are unlikely to just drop the cup. Instead, we may jerkily put the cup back on the table, and then tend to our hand by tapping it or blowing it. Furthermore, Melzack developed his theory explaining a pain experience as being unique to every individual (3). This pain experience is influenced by sensory, psychosocial, and genetic factors.

Figure 2: Gate Control Theory: "*Conceptual model of sensory, motivational, and central control determinants of pain. The output of T cells of the gate-control system projects to the sensory-discriminative system (via neospinothalamic fibers) and the motivational-affective system (via the paramedical ascending system). The central control trigger is represented by a line running from the large fiber system to central control processes; these in turn project back to the gate-control system, and to the sensory-discriminative and motivational-affective systems. All three systems interact with one another, and project to the motor system.*"
(Redrawn from Melzack, R., and P. Wall: The Challenge of Pain. London, Penguin Group, 1988, p. 191.)



1.2 Definition of terms

Important terminologies in this study that needs to be defined are:

Musculoskeletal pain

The word musculoskeletal comes from two major anatomical structures in the body, which are “muscles” and “skeleton”. When the origin of pain comes from either the muscles or bone, which may also include soft tissue structures like ligaments and tendons, it is often referred to as musculoskeletal pain (6). Generally we know that pain is an experience (7), musculoskeletal pain in this study was assessed through a self-reported questionnaire. Musculoskeletal pain was divided into *none or little pain* (NLP) which refers to the group with ‘no pain’ and *moderate-severe musculoskeletal pain* (MSMP) as the actual group ‘having pain’. Therefore, self-reported pain in this study is considered musculoskeletal in origin.

Psychological distress

The term psychological distress in this study refers to global psychological distress, which was assessed by The Hopkins Symptom check List (HSCL-10) (8;9). HSCL-10 has five questions each on anxiety and depression (10). However, it may not necessarily mean that the subjects in this study are depressed or suffering from an anxiety disorder. (*More details under independent variables*)

1.3 Literature Review

1.3.1 Prevalence and burden of pain

Chronic pain and other health related afflictions represent a 'black hole' in the world economy and raise public health concerns to the already burdened health and social care systems (3). The prevalence rates of chronic pain vary widely between 17% to 64% in various population studies (11-15). In Europe, pain prevalence varied markedly between countries – with more than 25% of adults in Norway, Poland and Italy reporting pain, while chronic pain in Spain was only reported by 11% of the adult population (16). However, it may represent more than one third of the population (17;18).

A telephone survey across 16 countries showed nearly 20% of adults suffering from chronic pain (16). The most frequent source of pain was the back (24%) and 35% of the respondents complained that arthritis or osteoarthritis were the most common cause of chronic pain. A Large proportion of reported common diagnoses (i.e. chronic musculoskeletal and arthritic conditions and spine disorders) have been correlated with a high coexisting risk for disability (16;19;20). To illustrate this point, at least 70 million Americans will be diagnosed with arthritis and related disability by 2030 (3).

A similar telephone survey in Sydney, Australia found 22% of the respondents suffer from chronic pain, musculoskeletal complaints were the most common (26%) (16). In both surveys, a high utilization of health services by those affected was noted.

A Swedish study reported that the prevalence of chronic regional pain was almost 24%, and chronic widespread pain was 11.4%. This was found among the general adult population even after controlling for age and gender (21). Two regions in Switzerland were studied for low back pain and it was found that 20.2% of men in the population age 24-34 had had persistent pain for more than seven cumulative days, and 28.5% in the 65-74 years age

group (22). Among women, 31.1% and 38.5% of the population reported pain, in the two groups, respectively.

In Norway, 'Norgeshelsa' provide self reported online[3] data on somatic pain from ages 16+ (23). The data showed the prevalence of pain among men and women was 19% and 29%, respectively. Hagen et al. found that 17% of the population reported non-inflammatory widespread pain (24). Another study showed, 17.9% reported having pain in five or six areas of the body while 9.8% reported pain in at least seven out of ten possible body areas (25). Rustoen et al. found 58.9% of their participants (ages 19-80) with chronic pain also reported having chronic conditions (i.e. musculoskeletal problems, non-specific chronic pain disorder, osteoarthritis, asthma, gastrointestinal disorders and psychiatric disorders) (26). A follow up study in Nord-Trøndelag found 51% of the respondents had chronic musculoskeletal complaints (i.e. pain and stiffness) (27).

Moreover, pain among children and adolescents has also been found. In Germany, 83% had experienced pain in the past 3 months and 38.8% of the children and adolescents said that their pain had persisted > 6 months (28). Among those children and adolescents with pain, more than two thirds reported restrictions in daily living activities. In the UK, a survey among pain specialists and general practitioners (GP´s) treating child patients with pain was conducted (29). They found that <5% of children suffered from chronic pain. In spite of this, 22% of the responders (pain specialists and GP´s) reported that the problem has been increasing during the last five years (29). Other studies suggest, pain increases with age (13;17;18;22;26). The experience of pain at a young age may indicate the development of chronic or widespread pain later in life.

Lien and his colleagues found musculoskeletal pain among adolescent immigrants in Oslo (30). Girls reported more pain than boys in most parts of the body (head, neck, shoulder, back, and stomach) except for the upper and lower extremities (arms/leg/knee). Even though the differences between

[3] http://www.norgeshelsa.no/norgeshelsaen/ (click on 'key statistics-health status-self reported health)

genders small in the number of pain sites across the immigrant groups, it was nonetheless statistically significant for both boys and girls.

A review of literature amongst the South Asian ethnic minority groups in the UK suggests that South Asian men aged 30-40 reported less musculoskeletal symptoms (14%) than the general population (31%) (7). However, South Asian women reported more symptoms than the general population (35% and 26%, respectively). The variations may relate to the possible differences in health seeking behaviour and in health conditions.

Alison et al. found that ethnic minorities of South Asian origin (Indians, Pakistanis, and Bangladeshis) in the area of Greater Manchester have a higher occurrence of both regional and widespread pain than the local ethnic population (31). The crude prevalence of musculoskeletal pain (non-specific area) among people age 45-64 was higher than the local ethnic groups. It ranges from 63% (lowest) among the Indian men and 89% (highest) among the Pakistani women, compared with local ethnic men (53%) and women (55%). There are gaps in the literature regarding the prevalence of musculoskeletal symptoms among the South Asians (or Asians in general) in their host countries (7;31). Thus, one can only make limited comparison using prevalence studies set in the UK and elsewhere.

The development of ‘chronic pain’ has a great impact on related psychological and social functioning (3). Studies in the Netherlands reported chronic pain and other related impairments and disabilities had significant socioeconomic consequences (32;33). These consequences are due to expensive healthcare costs, lost of wages and productivity, and the increasing costs of disability benefits and compensation.

Health related expenditures and lost productivity in the US has been conservatively estimated, at between $70- $120 billion annually (3). About 90 million physician visits per year can be accounted to chronic pain, 14% of all prescriptions, and 50 million lost workdays. Stewart et al. also found that 76.6% of productivity time loss on the job was related to pain and not due to absence from work (34).

Improved health care and advancements in medical technology have lead to an increase in the survival rates for the population. The early diagnosis of illnesses and better medical options available will also have the same effect on persons with life shortening disease. Those diagnosed earlier with terminal conditions may receive the same benefit. The anticipated expansion of the elderly population will further increase the prevalence of pain in the future (3).

1.3.2 Psychological, cognitive and behavioural aspects of pain

George Engel proposed the biopsychosocial model in 1977 which incorporates the social, psychologic and behavioral aspects of illness (35). In one of his articles he discussed various contextual meanings of persistent pain and the importance on how the individual perceives his or her pain (36). This is in parallel to the conclusion of Melzack and Wall, showing evidence that psychological approaches (i.e. psychotherapy, biofeedback, relaxation, etc.) have powerful effects on pain perception (37), which may change the experience of pain. However, the experience of pain varies from person to person and the individual himself may decide the right approach.

Santos et al. argue that psycho-physiologic pain syndromes and stress-induced pain disorders, as well as physiologic and affective perceptions of pain should be valued as learned reactions under the control of environmental forces (3). Fordyce proposed the 'operant-conditioning model of chronic pain', as means to an end in labelling and treating pain behaviours. Fordyce believed that pain behaviours can be modified by manipulation of rewards and punishments (37); and the way to abolish 'pain behaviour' is to stop all rewards (i.e. attention, sympathy from others, medications they want, avoiding chores or people, etc.).

In addition, Turk and Keefe proposed a cognitive and behavioural approach (memory and emotion) (3). They explained that thoughts and beliefs could influence, and be influenced by emotional and physiological responses. Moreover, the biopsychosocial model has contributed to the development of

a clinically rational school of pain evaluation and management (3). Hence, the experience of pain in this model has incorporated the physical, cognitive, affective, and behavioural components.

Cognitive and behavioural approaches emphasized by Melzack and Wall's gate control theory, were presented earlier in this paper (4;5). How a person perceives pain, depends on the individual´s beliefs, thoughts, and emotions. This may influence how pain is experienced. Söderfjell argued that pain is influenced by the individuals' beliefs caused by reason, duration of pain, precariousness and fear-avoidance (38).

Santos et al. explained the subsequent increased fear and avoidance behaviours in chronic low back pain patients (3). The increased fear levels and disability occurred independently with the pain intensity experienced. As a result, low back pain patients may be sceptical of moving. Classical conditioning reinforced through operant thinking induces fear of movement. In order not to extinguish fear, the patient avoids the conditioning anxiety and fear associated with movement. Therefore, decrease in movement and increased expectations of pain, may be due to fear and anxiety.

Pain beliefs, emotions, and passive coping are important affective factors which significantly affect pain response, behaviour, and meaning (3). Attitudes towards pain are learned early in life, as part of growing up in a particular locality, culture or family (39). These are an important part of any ethnical child-rearing tradition or socialisation. However, this may change over time, as societies go through social and economic development. Advances may also give rise to new technologies and new methods of pain relief. Therefore, background (i.e. learning, experiences from childhood, culture, and beliefs) may influence the individuals' understanding of pain entirely or partially.

Korol and Craig suggest that health care providers should be aware of dominant cultural beliefs regarding the medical system and the treatment of illness (40). They quote the South Asian belief about illness as fate, the will of God and 'karma'. The recovery of illness attributed to the will of Gods and the

skill of the physician. A positive relationship between perceived control over the disease and psychological adjustment was also recognized.

Western health care providers often give false impressions or stereotype, East Asian beliefs (40). East Asian patients tend to somatise distress and are unwilling to report symptoms of psychological conflict. These can be important to the cause and the persistence of their health concerns. Moreover, the Chinese and East Asians in general, find it more acceptable to receive help for somatic complaints than to receive a psychiatric diagnosis. Another reason for the non-reporting of psychological symptoms among Chinese patients is the fear of bringing shame upon their families. As a result, others focus on what is interesting to the physicians, which they believe are the physical symptoms that require immediate care.

The association between psychological factors such as depression and anxiety and musculoskeletal pain has been suggested in other studies (3;7;41-44). Recent data have demonstrated that psychological factors predict the later onset of both regional and widespread pain (7). In addition, Macfarlane et al. associated psychological distress with chronic widespread pain (43). Furthermore, Benjamin et al. also found a high prevalence of psychological disorders like anxiety, especially among individuals with widespread musculoskeletal complaints (41).

A review article by Njobvu et al. found consistently, that South Asians and other non-Western cultures tend to express psychological distress through somatisation or somatic metaphors, more often than the native Britons (7). In addition, cultural variations in the expression of psychological distress make it difficult for primary doctors to recognize the disorders among the South Asian minorities. Furthermore, health questionnaires (i.e. GHQ[4]) used for screening may under-diagnose psychological distress and be culturally insensitive (1). Nevertheless, the association between psychological distress and pain symptoms apply to all cultures (7).

[4] The General Health Questionnaire

Merskey argued that anxiety and depression causes muscle tension and eventually pain (45). "*We feel one cut from the surgeon's scalpel more than ten blows of the sword in the heat of the battle"* (Merskey: p.625). This quote explains that acute anxiety is liable to increase pain, whereas the high arousal for expected danger may arrest it. He also correlated that over-activity of muscles results in an increased production of waste metabolites. It may not disappear right away, which can cause pain in the muscles. He explained that chronic pain patients have reduced levels of maximum voluntary contraction of agonist muscles and an increase co-contraction of the antagonist muscles in the painful area of the body. These are protective physiologically, in order to prevent tissue damage. As a result, the contractions of the high force painful agonist muscles prevented, while favouring the slow movement and reduced speed co-contraction of the antagonists' muscles. The explanation given earlier regarding 'fear and avoidance' (3) model heightens the pain-related anxiety. Avoidance activities serve to promote the ongoing pain, physical de-conditioning and social isolation (3). Nonetheless, pain related to anxieties covers fear reactions across cognitive, behavioural, and physiological dimensions.

Moreover, disturbances in serotonin metabolism is correlated with depression, and on the other hand abnormal serotonin levels have also been associated with pain (43). This may explain the relationship between pain and depression. High levels of pain have been reported by depressed patients (3). They also tend to be less active, report greater disability and life disturbance related to pain, and are more likely to display overt behaviours. Elevated depression mediates the relationship between higher levels of pain and reduced cognitive functioning. Hence, it is important to understand the complex relationship between depression, chronic pain, and functional impairment.

In conclusion, the number of people suffering from pain and psychological distress is increasing worldwide (46). Chronic musculoskeletal pain has been a major health problem that is common in both developed (47) and developing countries (48). Factors found to be associated with psychological

distress are at work and at home, are low living standards, unemployment, being the victim of a crime or violence, and social factors. The harmful consequences of psychological distress for the individual as well as the community may result in functional disability, economic cost, sick leave and/or work disability (46). Often, under diagnosed by many doctors, psychological disorders are actually common (46;49).

1.3.3 Gender, ethnic and cultural aspects of pain

Various sources (7;11;12;21-24;30;50;51) have demonstrated gender differences in pain among adolescents and adults. Women in general report pain and other symptoms more frequently, not purely those of a particular kind. Berkley suggested the possible explanations to be cultural, biological, earlier knowledge, and psychosocial factors (52).

Women in some cultures welcome pain (for example in childbirth) as a natural experience rather than fearing the experience (39). Many women from Tamil Nadu (India) delivering in the hospitals, have their labour induced and accelerated by drugs such as oxytocin, even if this greatly increase pain during childbirth (53). This is because pain, known as *vali* – also means 'strength' or 'power' and is believed to increase the women´s level of s*akti*[5] or female regenerative power. Consequently, undergoing a greater pain resulted in greater *sakti.* In contrast, women in the USA, frequently demanded analgesia during labour (39).

Zola cited American studies among women from lower and upper socio-economic groups who were asked to report 'dysfunctions' in their body (54). Only a small percentage reported dysmenorrhoea as a dysfunction. Pain like dysmenorrhoea, is not regarded as a dysfunction among many women but rather a natural part of menstruation. Conditions presenting as 'not normal' (i.e. pain) that may require medical attention and treatment should be

[5] *'The activating principal of life and the principle of endless change that is both celebrated and feared'(Helman, p.173)* (53)

defined. It seems, this pain tends to be culturally characterized and may vary over time.

Söderfjell compared gender differences on experimentally induced pain. He found that males are less sensitive, and have higher thresholds, to induced pain compared to females (38). In other cultures or social group, the ability to bear pain among men is more likely expected (39). Thus, Engel points out, pain in this perspective becomes 'personal' (55).

Stoicism among the Anglo-Saxon displays 'stiff upper lip' in the presence of hardship (39). The ability to tolerate pain without drawing back is a transition from boyhood to manhood as well as a manner of gaining social prestige. Also in the Great Plains among the Cheyenne Indians, manhood and social prestige is displayed by undergoing a ritual of 'self torture' in the Sun Dance ceremony. They suspend themselves from poles by hooks passed through the skin of their chests. Consequently, the acceptance of pain without complaint is an illustration of their strength.

Ethnicity may be a factor to consider in the differentiation of health status (1;56), suggesting that differences identified between individuals in other cultural or ethnic groups are fixed or predisposed (7;39;57). For instance, cultural characteristics such as language and customs are distinct to some groups of people that represent a shared national identity. Therefore, in considering both reporting of pain and pain behaviours, "non-biological" factors may be of particular importance.

In addition, a review of literature from Giordano, found that socio-medical variations among ethnic groups are dependent on the influence of group and family solidarity (58). Low family dependency during illness means lower ethnic exclusivity, no friendly group solidarity, and no family orientation to tradition and authority. The more cohesive the group, the dependency of the sick individual is also greater. Moreover, social integration within the group is measured by the amount of support sought and secured during illness.

A study was conducted among immigrant women in Canada on how they define their own health (59). It revealed that they are unlikely to talk about the

non-physical aspects of health unless asked about the general contexts of their lives. The family's health is the final point of settlement for these women. Furthermore, their religious practices and spirituality were essential sources for health.

Zborowski studied reporting behaviours of groups of different ethnic backgrounds (57). He concluded that differences in reporting of pain are culturally bound. These differences are due to beliefs, attitudes and response patterns learned as part of the individuals' cultural (60;61) or ethnic tradition and/or socialisation .

Moreover, culturally defined languages of distress (i.e. *"Aray!"* in Filipino) may influence how pain is signalled to others and the type of reaction expected from it (39;60;61). Although a person´s age, gender, and social rank may disagree on this standard, still they are culturally bound (57;62). For example, in societies that value stoicism and resilience, pain is more likely to be expected among men, particularly younger men or warriors (39). As a result, those who fail to follow these norms may meet condemnation or even social sanctions.

Various studies also suggest that individuals from different ethnical backgrounds vary in reporting of pain (7;30;31;39;50;56;57) and co-morbidities such as psychiatric distress (7;30;31;39;41;42;50). These differences may be due to variations in pain thresholds (7;63) and reporting behaviours as pointed out by Zborowski (57).

An interesting review article by Njobvu et al., explained that clinical studies have shown the difference between ethnic groups in terms of pain tolerance and the amount of pain medication required (7). They found that Asian patients have a lower need of post-operative analgesics than the Europeans do. The pain score assessment revealed no difference in both groups (no information given on how they derived the pain scores). Their hypothesis suggests that lower amount of analgesics sedate the Asians easily.

On the contrary, Zatzick and Dimsdale conducted a study (63) on cultural variations in response to painful stimuli. They found that Asians have lower

pain threshold and tolerance than the Europeans. However, they concluded that no consistent evidence could support that ethnic differences existed in the ability to discriminate painful stimuli. They argued that if higher pain tolerance is acknowledged, the occurrence of pain is not entirely due to perceptions or attitudes towards the pain experience. The results of their study suggests that culture profoundly influences pain tolerance, which reflects the behavioural aspects of pain (63).

The impact of pain to the individual and society and its relationship to psychological factors was the motivation for pursuing this study. The aim of this thesis is to contribute additional knowledge and understanding of the association between musculoskeletal pain and psychological distress, especially among the immigrant minorities in Norway. Njobvo et al. stressed in his review paper, that more studies are needed to know the prevalence of pain amongst the ethnic minorities, in order to gain a better understanding about the aetiology of pain related disorders and to provide better health care services (7).

1.4 Objectives

The main objective of this study is to investigate the association between musculoskeletal pain and psychological distress among five immigrant groups in Oslo, Norway.

The following are the specific objectives of this study:

1. To assess the prevalence of musculoskeletal pain among five immigrant groups.
2. To describe the differences in the location of musculoskeletal pain among the immigrant groups across genders.
3. To determine the predictors that might explain the differences in musculoskeletal pain among the immigrant groups.

The following are the suggested research questions:

1. Is there any difference in the prevalence of musculoskeletal pain among the immigrant groups?
2. Is there any difference in musculoskeletal pain complaints between men and women among the immigrant groups?
3. What is the relationship of psychological distress to the prevalence of musculoskeletal pain among the immigrant groups?

2

Methodology

2.1 Study Design

This study will analyze cross-sectional data from the Oslo Immigrant Health Study[6] (Immigrant HUBRO) of 2002 (64).

2.2 Study area and population

The Norwegian institute of Public Health and the University of Oslo conducted the Oslo Immigrant Health Study in 2002 (65). According to the 2001 population register, 7972 individuals born from 1942-1971 were eligible to participate in the main cohort. Among these, 82 had either died or emigrated prior to the invitation, leaving 7890 for participation. Those reached by mail were 7607. For the young cohort born (1972-1982), 4116

[6] Folkehelseinstituttet: http://www.fhi.no/eway/default.aspx?pid=233&trg=MainLeft_5669&MainLeft_5669=5544:53584::0:5667:2:::0:0

individuals were eligible to participate in the study. Prior to the invitation, 60 were either dead or emigrated, leaving 4056 eligible individuals for participation. Only 3782 were reached by mail.

2.3 Participation

Main Cohort:

From the 7607 reached by mail, only 3019 gave their written consent and met the inclusion criteria (those who attended the screening or completion of at least one question in either of the questionnaires). Equaling 39.7% in the final response rate reached by mail. The response rates from different countries according to birthplace are 50.9% (Sri Lanka), 32.7% (Turkey), 38.8% (Iran), 31.7% (Pakistan), and 39.5% (Vietnam), respectively.

Young Cohort:

In the young cohort, 3782 were reached by mail, 707 (18.7% of those invited) participated in the study. The participation rates for the 20-30 year olds were 24.7% (Sri Lanka), 18.3% (Turkey), 20.4% (Iran), 15.4% (Pakistan), and 15.2% (Vietnam).

Due to missing data on pain questions, we ended up having 2458 participants in the analyses. Only subjects with complete data on all the variables used were included in the analyses.

2.4 Inclusion criteria

Oslo residents born in Pakistan, Vietnam, Iran, Turkey, and Sri Lanka between 1942 and 1981 were invited to participate in the study. Pakistan has the largest immigrant group therefore only a 30% random sample was invited to participate.

2.5 Exclusion criteria

The Immigrant HUBRO followed the same protocol as the Oslo Health Study 2000-2001 (HUBRO) (66). Individuals who have been previously invited to the earlier study (HUBRO)[7], belonging to the seven birth cohorts (1940/41, 1954/55, 1960, 1969/70) were excluded.

2.6 Efforts to increase attendance and remaining non-attendees

To increase the participation rates, non-responders from the adult cohort received one reminder between 3-8 months after the first invitation. No reminder was sent to the young cohort. Telephone calls were also made to follow-up the non-responders. In the reminder, mobile screening units were provided in the neighbourhood of those invited visiting 7 sites in the city over the period of 12 weeks (64).

2.7 Data collection method

In 2002, after the approvals and clearances for conducting the survey were given, the local districts and population were informed through mass media with various information techniques about the survey. An invitation was sent to all eligible individuals two weeks prior to the clinical screening; a letter of invitation was sent containing (64):

- Invitation to participate with time and place
- A three-page questionnaire
- Instructions on how to fill out the questionnaire and a letter of consent, to be handed in personally at the screening station

[7] http://www.fhi.no/eway/default.aspx?pid=238&trg=MainArea_5811&MainArea_5811=5895:0:15,4562:1:0:0:::0:0

- Information brochure containing the objectives of the survey, content, procedures, etc.
- Map that shows the locations of the screening stations
- All enclosures of this postal package were translated into the five appropriate languages of the target immigrant groups in addition to the official Norwegian version.

Three local districts were selected as screening sites that measured standardised screening procedures like vital signs, blood analyses, height, weight, etc. A supplementary questionnaire was handed out at the survey and could be filled in at the screening site with the assistance of field workers. Field workers that spoke the same language as the respondents were recruited prior to the screening (64). Four weeks after the clinical examination, all participants were informed of the results and received appropriate recommendations according to the HUBRO protocol (67).

2.8 Determining Ethnicity

Only the first generation immigrants belonging to the five selected countries were included in the study. Ethnicity was determined due to country of birth. The Norwegian population registers determine all residents through a special 11-digit identification code as the basis of their invitation.

2.9 Questionnaire

The main questionnaire for the Oslo Immigrant Health Study was identical to HUBRO (67) that included questions that form part of the larger CONOR[8] (Cohort Norway) data bank (64) and is available online [9].

[8] http://www.fhi.no/eway/default.aspx?pid=238&trg=MainLeft_5853&MainArea_5811=5853:0:15,2818:1:0:0:::0:0&MainLeft_5853=5825:56612::1:5857:2:::0:0

[9] http://www.fhi.no/dav/C65909BDDD494786B7CFAC0E0E4FF5EE.pdf

2.10 Dependent variable

2.10.1 Musculoskeletal pain

A similar questionnaire in 2000/2001 HUBRO (66) was used to measure musculoskeletal pain complaints. The respondents were asked to report whether they had experienced any pain and/or stiffness in muscles and joints from five different areas (neck/shoulder, arms/hands, upper back, lower back, and hips/legs/feet) in the course of the last 4 weeks. The level of intensity was categorized into “not troubled”, “somewhat troubled”, and “very troubled”.

Musculoskeletal pain data from each region of the body were scored 0, 1 and 2; for no pain (“not troubled”), moderate pain (“somewhat troubled”), and severe pain (“very troubled”), respectively. In obtaining the prevalence of moderate-severe musculoskeletal pain for *each* of the five areas of the body, “somewhat troubled and “very troubled” (scores 1 and 2) was merged, while “not troubled” (score 0) was assigned as none or little pain. The maximum total index score was therefore 10 for the five areas of the body. Mean pain scores were obtained based on the constructed index score (0-10) in this study.

For the logistic regression models, the total index scores were then dichotomized into NLP and MSMP. A cut off score of >2 was labeled as MSMP. The cut off score was used based on the mean pain score of the total sample (gender unaccounted) that is around 3. This provides a division of the group into two (NLP and MSMP) for our main variable musculoskeletal pain (MSP).

2.11 Independent variables

2.11.1 Psychological distress

The Hopkins Symptom Check List-10 (HSCL-10) (8) used to screen for symptoms of depression and anxiety, was developed from HSCL-90 and HSCL-25 (8;9;30;68). Because of its high sensitivity and specificity (8;30;68) , it was used to assess psychological distress in this study.

The HSCL-10 listed various problems asking the responded: (*"During the last week (including today) have you felt*…") a) sudden panic for no reason; b) frightened or anxious; c) fainting or dizziness; d) tensed or harassed; e) self-blaming or regret; f) sleeping difficulties or staying asleep; g) sad or dejected; h) useless or unworthy: i) everything is a burden; j) hopeless for the future. Each item was rated on a scale of 1 (not troubled) to 4 (much troubled) during the past week. Psychological distress was determined with a score of >1.85. Strand et al. considered a cut-off 1.85 (for HSCL-10) as a valid indicator to measure mental distress (8;30;69). Subjects that scored above the value of 1.85 in this study were labeled as "psychologically distressed".

2.11.2 Other independent variables

Age in years was obtained from the year of birth (provided by the population registers) of the participant minus 2002 (year of the survey). This was categorized into four groups (20-30, 31-40, 41-50, and 51-60) and age 20-30 years old was used as a reference group in the univariate logistic regression analyses. However, age was analyzed as continuous variable in the final multivariate logistic regression model.

Gender of the participants was identified through a unique 11-digit identification code from the Norwegian population registers.

For *civil status*, the participant was asked if they were married, registered partner, unmarried, widow or widower, divorced, separated, separated partner, divorced partner, or a surviving partner. This variable was dichotomized. Married and registered partner were combined together into 'In relationship' and other answers as 'Not in relationship'.

In the question about *smoking*, respondents were asked if they smoke: (yes, now; yes, earlier; and never). This variable was dichotomized as Yes and No (merging smoking earlier and never), based on the status of the respondent when the data was collected.

The respondent was asked about the *physical activity* undertaken during spare time in the course of the past year. Physical activities were described as sweating and feel out of breath. The possible answers for the question were (no activity, less than 1hr, 1-2hrs, and 3hrs or more) per week. For the analyses, this variable was not dichotomize.

For pre-migration experience: The participants were asked if they had been *injured in war*; or *tortured* (systematic physical or mental maltreatment); both questions were answerable by Yes or No.

The question about *experiencing serious economic problems* was worded, 'Have you experienced a serious economic problem?' the responder could answer Yes of No.

The *number of visit to primary doctor*, participants was asked how many times (0, 1-3 times, > 4 times) they visited their primary doctor within the past year.

2.12 Statistical analyses

Prevalence between groups was analyzed by a chi-square test, and differences in mean values were analyzed by one-way ANOVA and T-tests. Logistic regression was used to model effect of the explanatory variables on MSMP.

A Ninety-five percent confidence interval (CI) was set for chi-square tests, one-way ANOVA, T-tests, and odds ratios (ORs) of Musculoskeletal Pain and other covariates included in these analyses.

Data were analyzed using SPSS package 16.0 (70), and *P*-value less than 0.05 were considered statistically significant.

2.13 Ethical Considerations and Approvals

The Regional Committee for Medical Research Ethics cleared the study protocol that was approved by the Norwegian Data Inspectorate. This study has been completed in accordance with the ethical principles of the World Medical Association Declaration of Helsinki. All the participants of the Oslo Immigrant Study had given their written, signed consent. All the concerned personnel and staff involved in the survey are bound to confidentiality. The study conducted was not anonymous. However, the data has been encrypted to ensure confidentiality for researchers, including the data obtained from registers.

3

Results

3.1 Findings

The demographic characteristics of the 2458 participants are summarized in table 1. Mean age was highest among the Pakistani men and women, while lowest among Turkish women and Vietnamese men.

Pakistanis have the highest proportion of men in relationships and this is lowest among the Iranians. The Sri Lankans have the highest proportion of women in relationships and this is lowest among Iranian women. For those in relationship, there is a significant difference between country groups in the proportion of men and women ($P< 0.001$, $P< 0.001$, respectively).

The proportion of smokers among men was highest among the Turkish and this is lowest among the Sri Lankans. Among women, smoking was highest among the Iranians and lowest among the Sri Lankans. Smoking was

statistically significantly different among men and among women in the five ethnic groups (P< 0.001, P< 0.001, respectively).

Psychological distress was highest among the Iranian men and women between the five groups and this is lowest among Sri Lankan men and women. Statistical significant difference was found between the males across the five groups and the same result for the females (P= 0.002, P< 0.001, respectively).

The proportions that had experienced torture were highest among the Iranian for men and women, and lowest among the Pakistani men and none among the Sri Lankan women. Torture was statistically significant among men across the country groups and likewise among women, (P< 0.001; P< 0.01, respectively).

For those injured in war, the proportion was highest among the Iranians for men, women, and none among the Pakistani men and women. Significant difference statistically between the country groups was found among men but not among the women (P< 0.01, P= 0.13, respectively) who were injured in war.

Those who experienced serious economic problems, the proportions were highest among the Iranians and lowest among Pakistanis for men and women. The experience of serious economic problems was only statistically significant among men between the five ethnic groups (P< 0.01).

The proportion with no physical activity was highest among the Turkish and lowest among the Vietnamese for men. For women, those with no physical activity were highest among the Pakistani women and this is lowest among the Turkish women. Those with no physical activity were only statistically significant among the women in the five groups (P< 0.01).

The respondents' who visited their primary doctors > 4 times last year was highest among the Iranian and this is lowest among the Pakistanis for men. For women, the Turkish have the highest proportion and this is lowest among the Pakistanis. There was no significant difference statistically between men in the five ethnic groups and the same result was found among women.

Comparing the five ethnic groups (not accounting for gender) only no physical activity and those who visited their primary doctor (GP's) > 4 times have no statistical difference (P= 0.76, P= 0.35, respectively). (Results not shown in table)

Among men across the five groups, the neck/shoulders are the most common site of moderate-severe musculoskeletal pain (table 2). Turkish men have the highest percentage of moderate-severe musculoskeletal pain in all five areas of the body. The Sri Lankans have the lowest proportion of moderate-severe musculoskeletal pain in the neck/shoulder, and lower back areas. Moderate-severe musculoskeletal pain among men in all the areas of the body were statistically different (P< 0.01), except on the arm/hand areas (P= 0.11) across the five groups. Total MSMP was highest among the Turkish and lowest among the Sri Lankans Statistical difference was found between the five groups for the total MSMP (P< 0.01).

For women, the most common site of pain was the neck/shoulders, except for lower back pain, which is the most common among the Sri Lankan women across the five groups (table 2). Sri Lankans have the lowest prevalence of moderate-severe musculoskeletal pain in all five areas of the body. Pakistani women have the highest proportion for those having MSMP in the neck/shoulder area. Moderate-severe musculoskeletal pains in all areas of the body were statistically different across the five countries (P< 0.01). Total MSMP was highest among the Turkish and lowest among the Sri Lankans. The total MSMP was statistically different among the women between the country groups (P< 0.001).

Among the five nationalities, only the Vietnamese have significant difference statistically (P< 0.01) between the proportion of men and women having pain in all the five areas of the body (table 2). Within the Turkish group, only low back pain has no significant difference between genders. For Iran and Pakistan, the proportions with pain in the neck, shoulder, arms, hands, hip, leg, and foot pain areas are statistically different between genders (P< 0.01).

Between the country groups (not accounting for gender), moderate-severe pain in all the areas of the body are statistically different (P< 0.001) (table 2).

For total MSMP, there is a significant difference statistically in the proportion between the five countries (P< 0.001) (table 2; figure 3). There was significant (P< 0.01) statistical gender difference on the total MSMP across the nationalities, except for the Sri Lankans.

Mean pain scores were highest among the Turkish in both genders (table 3). Between the five ethnic groups, the mean pain score is significantly statistically different (P< 0.001) for gender, age, smoking, and psychological distress, torture, injury in war and ESEP.

Within the country groups, in relationship (civil status) showed a statistically significant difference for Turkish and Pakistanis, (P< 0.01, P= 0.04) (table3). Smoking showed significant statistical difference for Sri Lankans (P= 0.01) and Iranians (P= 0.02). Psychological distress showed statistical significant difference in all the five groups (P< 0.001).

For the pre-migration factors torture showed a statistically significant difference in the mean pain scores for Iranians, Pakistanis and the Vietnamese (P= 0.03, P= 0.04, P< 0.01), respectively (table 3). Injury in war was significantly different among the Iranians only (P= 0.001).

For those who have experienced serious economic problems, statistically significant differences in the mean pain scores were shown among the four groups (Sri Lanka, P= 0.02; Turkey, P= 0.04, Iran, P< 0.001, and Vietnam, P< 0.01, respectively) except for the Pakistanis (table 3). Physical activity (PA) and the number of visits to a primary doctor showed no statistical difference for all the five groups.

Univariate analyses (logistic regression) were used to show the association of each independent variable with MSMP (>2 of the 0-10 index) as the dependent variable (table 4). This study found several significant (P-value < 0.05) predictors like age, female gender, experienced torture, injury in war, etc., (table 4) to be associated with MSMP.

Without controlling for possible confounding factors, the strongest predictor of reporting MSMP was psychological distress, recording an OR of 7.51 (5.87-9.61) (table 4). This indicated that respondents who had psychological distress were over 7 times more likely to report MSMP. Being female, the odds of reporting MSMP are 1.65 (1.41-1.94), indicating that females are 1.65 times more likely to report pain than males. The OR for MSMP increases with age. Those belonging to 51-60 age groups have odds of almost three times higher to report MSMP than the 20-30 year old age group.

Turkish immigrants were almost three times more likely to report MSMP than the Sri Lankans (reference group) (table 4); Pakistanis have an OR of 2.05 (1.59-2.64) in developing MSMP than the Sri Lankans, Turkey, 1.8 (2.02-3.34) and Vietnam 1.5 (1.21-1.92).

Smokers have an OR of 1.56 (1.28-1.90) indicating that they are at least 1.5 times more likely to report MSMP than non-smokers (table 4). Those who have been tortured are 2 times more likely to report MSMP compared to those who have not been tortured. Injury in war predicts the development of MSMP by almost three times over those who have not been injured in war. Those who have experienced serious economic problems (ESEP) have an OR of 2.5 (1.85-3.31) indicating that they are 2.5 times more likely to report MSMP than those who have not experienced serious economic problems. Physical activity and visits to a primary doctor were not significantly associated to MSMP. Only variables (table 4) with P-value of ≤ 0.05 were considered significant and were used as the basis of inclusion in the adjusted multivariate analyses model.

The association of psychological distress and MSMP was modeled in a multivariate logistic regression analyses (table 5). Age, gender, and psychological distress were the consistent variables in all five nationalities that showed statistical significance (not shown in the table). Sri Lankans showed the strongest crude OR of 9.18 (5.20-16.19) for psychological distress across the five nationalities. This indicated that Sri Lankans who had psychological distress were over 9 times more likely to report MSMP.

Adjusting for age and gender, only the Sri Lankan group showed an increase in OR to 9.55 (5.39-16.93); and OR was weakest among the Turkish group. Immigrants from Pakistan showed the strongest psychological distress OR >18 (4-81) after the adjustment of pre-migratory factors and ESEP. This indicates that those Pakistanis who had experienced torture, injury in war and ESEP were over 18 times more likely to report MSMP, after controlling for pre-migratory factors and ESEP. When other factors were included in the fully adjusted model, ORs increased for Sri Lanka, Turkey and slightly among the Vietnamese. The ORs for Iran and Pakistan decreased and were lowest among the Iranians.

Overall, after controlling for possible confounding factors, the association of MSMP and psychological distress among the five immigrant groups has been shown in the final model (table 5) of these analyses.

3.2 Tables

Table 1. Demographic and background characteristics in Means (SD) and Percentages with Moderate-Severe Musculoskeletal Pain (*N*) of the Immigrant groups in the Oslo Health Study 2002.

Country of Birth	Sri Lanka	Turkey	Iran	Pakistan	Vietnam
Men					
N = 1256	**420**	**191**	**252**	**198**	**195**
Age in years	**37.2** (7.8)	**36.5** (10.3)	**37.5** (8.4)	**38.9** (11.6)	**36.4** (10)
% In relationship†	**92.1** (151)*	**80.6** (83)*	**57.1** (68)*	**94.6** (88)*	**66.7** (46)*
% Smoking †	**24.2** (37)*	**59.8** (61)*	**50.4** (59)*	**41.1** (37)*	**43.5** (30)*
% Psych. Distress (HSCL-10>1.85)†	**25.5** (39)*	**39.6** (38)*	**47.4** (54)*	**26.8** (22)*	**31.7** (20)*
% Experienced Torture†	**16.9** (11)*	**5.4** (3)*	**58.9** (33)*	**2.4** (1)*	**28.1** (9)*
% Injured in war†	**17.7** (11)*	**4.2** (1)*	**33.3** (17)*	**0***	**18.5** (5)*
% ESEP[b]†	**28.1** (18)*	**36.7** (22)*	**51.7** (30*)	**16.3** (7)*	**32.3** (10)*
% With No PA≠ per week	**57.1** (28)	**68.8** (22)	**60.6** (20)	**57.7** (15)	**47.6** (10)
% Using ≈GP´s > 4 times last yr.	**36.4** (12)	**25.9** (7)	**45.2** (19)	**34.3** (12)	**42.3** (11)
Women					
N = 1202	**350**	**201**	**207**	**168**	**276**
Age in years	**33.9** (8.5)	**34.1** (10.1)	**35.2** (10)	**36.8** (11.2)	**34.8** (10.1)
% In relationship†	**87.2** (116)*	**84.3** (118)*	**64.1** (82)*	**84.1** (95)*	**73.3** (84)*
% Smoking†	**.8** (1)*	**27.6** (37)*	**29.8** (68)*	**3.9** (4)*	**6.0** (9)*
% Psych. Distress (HSCL-10>1.85)†	**26.0** (32)*	**48.9** (64)*	**51.2** (62)*	**40.6** (43)*	**41.6** (64)*
% Experienced Torture†	**0** (0)*	**4.8** (3)*	**16.2** (12)*	**11.6** (5)*	**7.2** (5)*
% Injured in war	**2.0** (1)*	**3.0** (1)*	**10.6** (7)*	0*	**9.4** (5)*
% ESEP[b]	**25.0** (14)*	**23.9** (16)*	**33.8** (26)*	**12.8** (6)*	**23.2** (16)*
% With No PA≠ per week †	**39.5** (15)	**26.5**(9)	**41.9** (13)	**63.0** (17)	**47.5** (30)
% Using ≈GP´s > 4 times last yr.	**42.5** (17)	**47.2** (17)	**43.8** (14)	**19.0** (4)	**26.8** (11)

P -values (ANOVA and Chi-square): * Not accounting for gender, statistically significant between the five countries (P < 0.001). †Significant difference (< 0.01) between the ethnic groups (within gender);

[b] Experience of Serious economic Problems; ≠ Physical Activity; ≈GP's-General Practitioners

Table 2. Prevalence of Moderate-Severe Musculoskeletal Pain among the Immigrant groups in the Oslo Health Study 2002. [Percent(*n*)]

Country of Birth	Sri Lanka	Turkey	Iran	Pakistan	Vietnam
Men					
Neck/shoulder pain†	51.7(269)	66.1(164)*	61.8(207)**	63.7(156)**	55.1(135)**
Arm /hand pain† *	39.3(190)	47.5(106)**	46.6(146)**	42.5(99)**	39.2(89)*
Upper back pain†	42.9(210)	55.3(125)*	47.6(140)	48.3(113)*	34.7(77)*
Lower back pain†	47.8(240)	61.2(147)	51.0(152)	50.0(115)	50.0(114)*
Hip/leg/foot pain†	48.9(249)	57.0(135)*	48.4(152)*	46.2(108)*	34.8(78)**
% Total MSMP[b]	**39.0**(164)	**53.9**(103)∞	**47.2**(119)∞	**47.0**(93)∞	**35.4**(69)∞
Women					
Neck/shoulder pain†	47.7(210)	79.3(203)	78.5(212)	82.7(187)	72.7(245)
Arm /hand pain†	42.7(173)	64.4(152)	65.2(163)	58.8(120)	53.3(168)
Upper back pain†	42.5(172)	66.4(154)	54.9(130)	57.7(113)	48.2(145)
Lower back pain†	50.8(211)	66.2(157)	58.1(136)	54.9(107)	60.7(190)
Hip/leg/foot pain†	44.1(179)	70.3(173)	59.8(147)	61.7(129)	52.2(166)
% Total MSMP[b]	**38.0**(133)	**69.7**(140)∞	**61.8**(128)∞	**67.3**(113)∞	**58.3**(161)∞

P -values (Chi-square) were significant *(P < 0.01) and ** (P < 0.001) between genders within the ethnic groups. All areas of the body are significant (P < 0.01) between countries (by gender) except * (P < 0.107); †Significant between countries (no gender) (P < 0.001);

[b] Total Moderate-Severe Musculoskeletal pain index score > 2 (0-10 index) between the five countries, significant for men and women *P* ≤ 0.001; ∞ Significant between genders (within the country) P< 0.01;

[b]Between countries alone (no gender) *P*-value < 0.001.

Table 3. Mean pain scores* of the Immigrant groups in the Oslo Health Study 2002.

Country of Birth	Sri Lanka Mean(SD)	Turkey Mean(SD)	Iran Mean(SD)	Pakistan Mean(SD)	Vietnam Mean(SD)
Gender†					
Male	2.37(2.47)	3.48(3.01)*	2.85(2.75)*	2.85(2.89)*	2.31(2.65)*
Female	2.37(2.56)	4.92(3.31)	4.07(3.12)	4.24(3.09)	3.50(2.88)
Age†					
20-30 years	1.67(2.07)*	2.84(2.55)*	2.56(2.47)*	2.42(2.33)*	2.03(2.05)*
31-40 years	2.43(2.47)	4.89(3.20)	2.98(2.68)	3.12(2.95)	2.59(2.77)
41-50 years	2.61(2.76)	4.62(3.59)	3.83(3.17)	4.05(3.36)	3.58(2.87)
51-60 years	2.87(2.78)	4.72(3.32)	5.16(3.44)	4.31(3.15)	3.95(3.24)
Civil status					
Not In relationship	2.16(2.62)	3.29(2.89)*	3.36(2.97)	2.67(2.73)*	2.97(2.85)
In relationship	2.40(2.49)	4.46(3.3)	3.43(3.0)	3.62(3.09)	3.04(2.84)
Smoking†					
Yes	3.08(2.65)*	3.98(3.09)	3.90(2.93)*	3.54(3.18)	2.89(2.82)
No	2.31(2.49)	4.33(3.32)	3.17(3.01)	3.48(2.97)	3.03(2.86)
Psychological Distress†					
Yes	5.03(2.65)*	6.36(2.94)*	5.12(2.88)*	5.59(2.81)*	5.39(2.97)*
No	1.99(2.22)	3.20(2.86)	2.57(2.69)	2.72(2.68)	2.27(2.37)
Torture†					
Yes	2.91(2.51)	4.00(3.58)	4.09(2.89)*	5.33(2.07)*	4.45(3.15)*
No	2.37(2.59)	3.89(3.15)	3.14(2.95)	2.92(2.83)	2.62(2.79)
Injured in war†					
Yes	2.95(2.30)	2.67(2.52)	5.14(3.0)*	[b]	4.29(3.34)
No	2.57(2.71)	4.14(3.12)	3.26(2.88)	3.50(3.09)	2.89(2.86)
Experience Serious Economic Problem†					
Yes	3.09(2.81)*	4.75(3.0)*	4.83(3.19)*	3.83(3.60)	3.81(3.08)*
No	2.21(2.47)	3.69(3.20)	2.90(2.75)	2.88(2.77)	2.40(2.74)
Hard Physical Activity					
>3 hrs / week	2.65(2.39)	4.38(3.18)	2.20(2.53)	2.30(2.06)	2.67(2.67)
1-2 hrs / week	2.54(2.73)	5.07(3.73)	3.55(3.28)	4.27(3.85)	3.61(3.01)
< 1 hr / week	2.64(2.62)	4.61(2.81)	3.89(3.62)	2.94(2.65)	2.79(2.46)
0 hr / week	2.55(2.50)	4.47(3.39)	3.45(2.96)	3.25(3.02)	3.03(2.68)
Visits to primary doctor last year					
0	2.98(3.07)	3.89(3.41)	3.16(3.01)	3.09(3.10)	2.27(2.65)
1-3 times	2.19(2.74)	4.17(3.44)	3.04(3.01)	2.89(2.96)	2.77(2.78)
> 4 times	2.09(2.40)	4.38(3.70)	3.69(2.91)	3.04(2.65)	2.95(2.71)

*Based on pain index 0-10; *P* –values (< 0.05) were significant differences within the five ethnic groups for those marked. (T-Test/ANOVA); [b] No computation due to missing data.

†Significant between countries (P< 0.001); Standard Deviation (SD).

Table 4.

Univariate association of MSMP to each independent variable.

Variable	Total *N*[b]	Odds Ratio (CI)**	*P*
Gender			
Male *	1256		< 0.001
Female	1202	1.65 (1.41-1.94)	
Age			
20-30 years*	494		
31-40 years	1073	1.46 (1.18-1.82)	< 0.001
41-50 years	537	2.04 (1.59-2.62)	
51-60 years	353	2.80 (2.11-3.72)	
Civil Status			
Not in relationship*	623		0.1
In relationship	1835	1.17 (.97-1.40)	
Country of Birth			
Sri Lanka*	770		
Turkey	392	2.60 (2.02-3.34)	
Iran	459	1.86 (1.47-2.34)	< 0.001
Pakistan	366	2.05 (1.59-2.64)	
Vietnam	471	1.52 (1.21-1.92)	
Smoking			
No*	1792		< 0.001
Yes	532	1.56 (1.28-1.90)	
Psychological Distress			
No*	1781		< 0.001
Yes	527	7.51 (5.87-9.61)	

Continue….

Variable	Total N^b	Odds Ratio (CI)**	*P*
Torture			
No*	1009		< 0.001
Yes	128	2.02 (1.38-2.96)	
Injured in war			
No*	741		< 0.001
Yes	65	2.85 (1.61-5.04)	
Experience Serious Economic Problem			
No*	926		< 0.001
Yes	250	2.47 (1.85-3.31)	
Hard Physical Activity/wk			
> 3 hrs*	65		
1-2 hrs	112	1.06 (.57-1.95)	0.86
< 1 hr	142	1.16 (.64-2.09)	0.62
0 hrs	343	1.20 (.70-2.03)	0.51
Visits to primary doctor last year			
0*	167		
1-3 times	305	.89 (.61-1.30)	.55
>4 times	242	.31 (.83-1.82)	.31

***** Reference group; **b** Total number; ******Confidence Interval.

Note: Only significant *P-values < 0.05 were included in the fully adjusted model.*

Table 5.

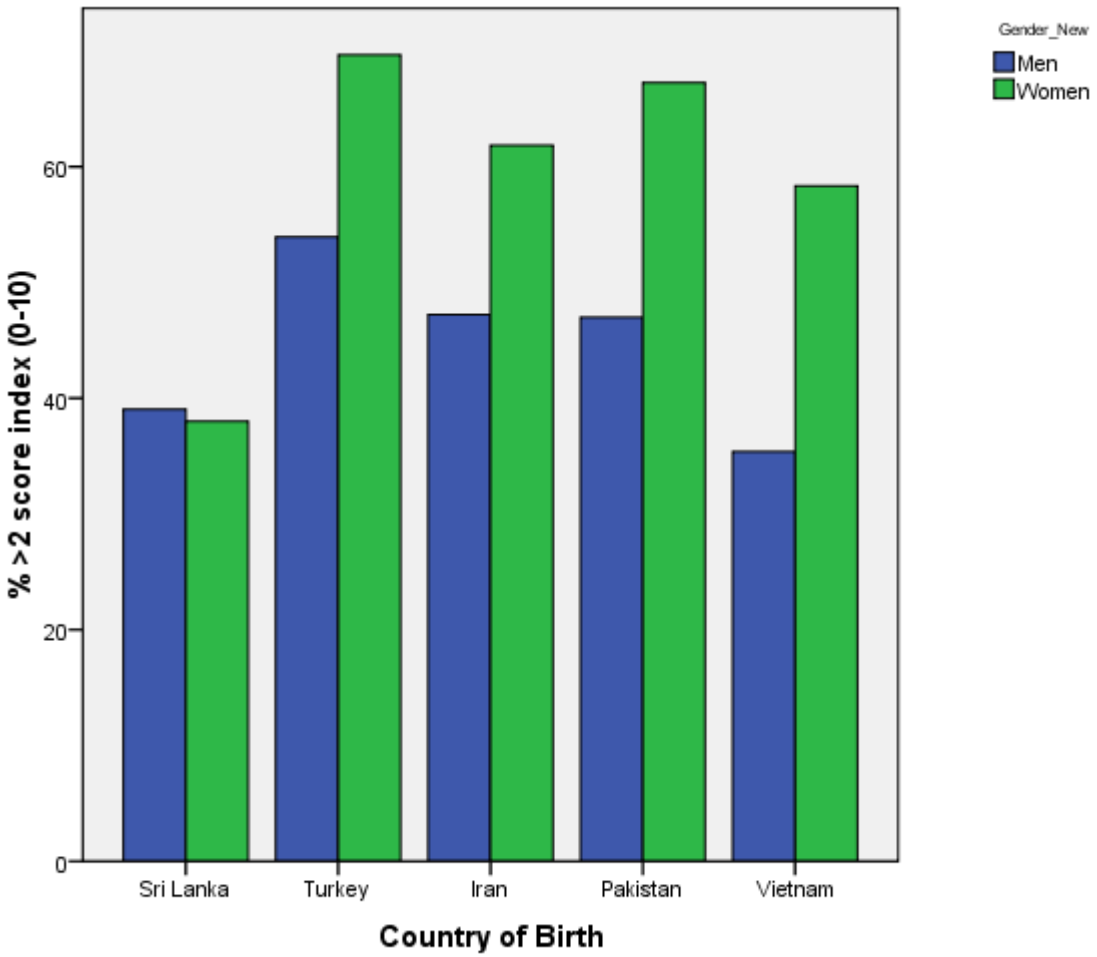
Adjusted OR with 95% CI for the association of MSMP and psychological distress of the Oslo Health Study in 2002 by ethnical background.

	Country of Birth				
	Sri Lanka (*N=716)* **OR 95% (CI)**	**Turkey** (*N=366)* **OR 95% (CI)**	**Iran** (*N=439)* **OR 95% (CI)**	**Pakistan** *(N=341)* **OR 95% (CI)**	**Vietnam** *(N=446)* **OR 95% (CI)**
Crude OR: Psychological Distress	**9.18 (5.20-16.19)**	**6.27 (3.50-11.24)**	**6.67 (4.11-10.83)**	**7.56 (3.72-15.34)**	**6.26 (3.70-10.58)**
Adjusted for age and gender	**9.55 (5.39-16.93)**	**5.43 (3.00-9.84)**	**6.46 (3.94-10.58)**	**6.77 (3.27-14.02)**	**6.03 (3.48-10.45)**
Adjusted for pre-migration factors *	**16.83 (4.95-57.26)**	**7.34 (1.78-30.29)**	**10.99 (4.58-26.38)**	**18.45 (4.16-81.77)**	**8.39 (2.79-25.25)**
Adjusted for ESEP **	**15.17 (4.41-52.19)**	**6.90 (1.58-30.06)**	**8.12 (3.29-20.02)**	**18.09 (4.04-81.12)**	**7.33 (2.38-22.60)**
Adjusted for other factors [b]	**22.04 (4.97-97.77)**	**9.53 (1.92-47.22)**	**7.48 (3.00-18.66)**	**14.87 (3.21-68.95)**	**7.99 (2.53-25.24)**

*Adjusted for age, gender, torture, injured in war; ** Adjusted for age, gender, torture, injured in war and ESEP (Experienced Serious Economic Problem; [b] Adjusted for all variables in ** including smoking and civil status.

Note: Due to missing data, no separate gender analysis was made; and some of the variables were not included in the fully adjusted model and the number (*N*) may be lower than in other tables.

Figure 3: **(The Proportion of men and women with Moderate-Severe Musculoskeletal Pain in the Oslo Health Study 2002)**



4

Discussion

This chapter will discuss the strong association between MSP and psychological distress as the main finding of this study. Several factors will be presented as possible reasons causing psychological distress that may result to the development of MSP. The differences in musculoskeletal pain between genders and the five immigrant groups are also discussed in this chapter.

Psychological Distress Associated with Musculoskeletal Pain

It is general knowledge that age is a risk factor for pain, and being a female gender also a known risk factor for psychiatric distress (71). This study found that both age and gender are significantly associated with MSMP; and psychological distress was the strongest predictor of MSMP in all five-immigrant groups after age and gender are controlled. The results of these findings answer the third research question of this study, which are in accordance to prior surveys (associating MSP and psychological distress) not just specifically among immigrants (17;18;21;42;72-76).

A literature review by Njobvu et al. described psychiatric distress as a common co-morbidity of chronic pain experience (7). They argued that there is much support for the association between the pain and psychological distress; and it applies to all cultures. Thus, Benjamin et al. reported 16% of the subject with chronic widespread pain had mental disorder (41), while McWilliams et al. found 20.2 % of those with depression had chronic pain (44). However, no clear direction has been established which of the two comes first.

Gureje et al. conducted a world survey regarding the relationship of multiple pains and mental disorders (42). This study was based on a data from 18 surveys carried out in different countries in the Americas, Europe, Asia, and the South Pacific. They found that the prevalence of depression and anxiety disorders[10] increases with the number of pain sites. These findings are similar to all the countries included in the study. However, the pattern of association between the number of pain sites and anxiety disorders were less consistent, due to the limited prevalence rates of specific anxiety disorders. Their study suggests that pain condition increases the likelihood of occurring psychiatric disorder and this risk is further increased when pain at multiple sites is present.

A study from Dalgard and Thapa found that psychological distress was higher among non-western immigrants in Norway compared to their western counterpart (10). Various factors including migration may lead to poor mental health (77). These factors consist of, the migrant's experience, the individual's personality, social class, resources, age, gender roles, employment status, cultural background, degrees of social cohesion, and the response of their host community. This is relevant information that needs consideration, before, during and after migration. Consequently, adverse psychological factors do predict the future onset of both regional and widespread pain, and are associated with a poor outcome (7).

Bodily pain associated with mental distress was also found among non-Norwegian adolescents in Oslo, according to Lien and his colleagues (30).

[10] i.e. generalized anxiety, panic disorders, social phobia, PTSD.

The number of painful sites in the body was associated with mental distress. Hence, their study supports other studies (42-44;75;78;79) describing how psychological distress is being associated with pain.

Migrants and Psychological Distress Associated with Pain

Although migration seem to increase the risk of mental illness, the exact reasons for these complexities are not clearly understood (77). The change of environment (not only a change of country) creates a shift of exposure to the new risks factors[11] in the host society. Exposure to an unfamiliar Western living may change the lifestyle of the immigrants (80;81). In addition, Thapa and Hauff argued that, their study confirmed their earlier findings especially among male refugees (71). Severe traumatic experiences have continuing impact on trauma even several years after their resettlement. Poor socio-economic status was associated with psychological distress among immigrants and refugees, which corroborates with other earlier studies (73;80).

Migration alone may not cause pain, however, migration has been argued as a risk factor that may lead to psychological distress (77). Similarly, poor mental health has been associated with the development of musculoskeletal complaints (43;82). Furthermore, the effects of migration can be detrimental psychologically and physically to the individual, especially among refugees who often are involve in a process of multi-migration (77).

On the contrary, a study in Canada suggests that the 'healthy immigrant effect' is a likely factor to consider (56). Canadian immigrants are healthier than the native-born Canadians do, due to the selection process of migration.

In the UK, one out of six refugees is reported to have physical health problems (77). Two thirds have experienced anxiety or depression. Significant associations between new negative life events (in the host

[11] i.e. socio-economic status, housing conditions, reactions of the new society (discrimination, racial prejudice, racial harassment) and language (77),

country) and psychological distress have also been found among the immigrants and refugees in Norway (71).

Moreover, family structure inversions due to migration has negative effects on the health of family members (77). The new geography or landscape may create space inversions among the family members, especially the children. They may be used to travel in far distances without transportation or communication; and time (punctuality) may be a valuable issue for the host society (or vice-versa). Inversions may reduce family cohesion, degree of social support, and the authority of parents and grandparents over their children. Furthermore, men may be used to working to provide the family's income and the wife is takes care of the children at home. This role may change upon moving to a new society or western lifestyle. Women in western societies commonly work and contribute to the income of the family.

Thapa and Hauff explained that men and women have different perception of distress risk factors (71). They pointed out that gender roles are also a significant factor in psychological distress. The results of their study found that middle-eastern women living alone, aging, and with no home security are risk factors in the development of psychological distress. Among men, unemployment plays an important role in psychological distress.

In conclusion, poor mental health has been associated among the immigrants (in their host country) in various studies (7;51;77;83). These findings suggest that pain is co-morbid with poor mental health because of migration. However, evidence has shown that when immigrants become more integrated into their host country, the levels of psychological distress reduce (7). Syed et al. concluded that to improve mental health among Pakistani immigrants in Norway, socio-economic and psychosocial factors have to be addressed (73). Eisenman and his colleagues argued that the experiences of immigrants and refugee patients have to be inquired about by the clinicians, in making differential diagnosis between psychological distress and chronic pain (49).

Pre-migration factors and Socio-economic Status Associated with Pain

At present about 20% of the population in Oslo is represented by immigrants (65). Many immigrants from Turkey and Pakistan moved to Norway to seek a better life and employment for economic reasons in the late 60's (84). More than one quarters of the immigrants in Norway are asylum seekers or are here for humanitarian reasons (refugees) (71).

Pre-migration factors (injury in war and torture), ESEP was found to be significantly associated with musculoskeletal complaints in this study. The immigrant groups in this study are asylum seekers or refugees from war torn countries, which may explain the increase of pain experiences reported from these groups (85).

The highest ORs for MSMP among the five immigrant groups were from the Sri Lankans and Pakistanis, after controlling for pre-migration factors. Those responders who have been injured in war, tortured and/or psychologically distressed may also have multiple musculoskeletal pain complaints or MSMP. Merskey found that depression is twice as common in those who have pain, and affects almost 19% of patients with chronic pain and approximately 9% without chronic pain (45). This might explain the increased MSMP among the immigrants in this study when controlled for psychological distress.

Previous studies on psychological distress among Vietnamese refugees in Norway has been associated with war traumas like torture and the experience of war itself (81;86). Somatisation has also been found among these refugees. In addition, psychological distress was associated with traumatic life events and serious financial problems among immigrants in Oslo (71). Moreover, a high prevalence of psychological distress has been associated with exposure to violence and economic problems among the Turkish and Iranian immigrants in Sweden (80).

Furthermore, this study are in accordance with other studies (49;87-90) associating musculoskeletal complaints and the experience of trauma (such as political violence, war and torture). Other studies (50;81;83;91) concerning

immigrants (in their host nation) have also associated musculoskeletal complaints with low socio-economic status, the experience of violence, trauma or war.

Musculoskeletal Pain

The results of this study show that the neck and shoulders are the most common sites of pain for both genders in all groups (except for Sri Lankan women). Women from Turkey, Iranian, Pakistan, and Vietnam have higher prevalence of MSMP than men do in all five areas was found in this study. Thus, answering the first and second research questions in this study.

A study in Sweden investigated self-reported headache and musculoskeletal pain in the population age 20-64. They found that shoulder and back pain as the most commonly reported problem followed by pain in arms/legs (fifth place) and headache (eight place) (92). At least one of these symptoms has been experienced by 45% of the study population during the previous two weeks. Women (50%) reported these problems more than men (38%) did. The ratio of shoulder pain is almost twice for women than men; pain in arms/legs 1.3; and back pain 1.2 between men and women, respectively. Hence, the high prevalence of MSMP found in this study among women from Turkey, Iran, Pakistan and Vietnam are consistent to other studies (30;50;92;93) describing gender differences in self-reported pain.

Surprisingly, the results among the Sri Lankans show otherwise. Earlier in the background of this study, Helman described how women from Tamil Nadu, South India welcome the increased level of '*sakti*' (39). The close proximity of Sri Lanka to Tamil Nadu and having a similar language may indicate similarities in the culture and worldview of women when it comes to pain. The cultural *'sakti'* belief may affect the understanding, or explain the behaviour of the Sri Lankan women in the reporting and acceptance of pain. As pointed out by Zborowski (57) earlier in this paper, cultural behaviour may be associated to gaining social prestige and acceptance. 'Cultural stoicism' according to the description of Helman, may well explain the

reporting behaviour (39). Fabrega and Tyma also stressed the linkage of pain being involved in a common semantic matrix which is rooted in historical and cultural factors (61).

The prevalence estimates reported in this study may be higher in range than in other studies (16-18;92). However, moderate and severe pain are combined together as one group “having pain”, giving the results of this study a high prevalence of pain.

Bingefors and Isacson explain in general why differences in pain vary (92). Reporting behaviour, biological factors, difference in perception of pain, discrimination of pain, threshold and tolerance may explain these differences, (92). In addition, Gender disparities at work, socio-economic factors, and expectations between genders could also be plausible explanations.

This study show statistical differences in the total MSMP among the five ethnic groups. In a study among patients with chronic pain from six different ethnic groups, it was found that pain intensity was affected by differences in attitudes, beliefs, emotional and psychological states associated among the ethnic groups (94). Pakistan ranked second after Turkey in the proportion of women with MSMP between the five groups and among the highest including men. Since pain is a subjective experience (2), differences in the intensity and reporting of pain may also apply among the immigrants of this study.

Moreover, the high prevalence of widespread pain among south Asians (Indian and Pakistani) immigrants has also been found in the United Kingdom and remains high even after accounting for factors like age and gender (95). In Sweden, a high prevalence of musculoskeletal pain among Turkish immigrants has also been found (96). Their pain was associated with psychosocial parameters.

Literatures suggest that differences in pain is influenced by social, cultural (60;61) and psychological factors (39). In other cultures, pain may be kept purposely in private and viewed in a different way (62). They may link their

pain as transgressions[12]. In some cases as an example, those who are in pain maybe too young to express their suffering. Other instances[13], the expression of pain may not likely bring concerned response from others. As a result, even if private pain is not reported by the respondents in this study, it may not necessarily mean its non-existence.

To conclude, this study is concerned with five different ethnic groups. Their health beliefs and understanding of pain may vary among them, which may explain the differences in results of this study. Pugh described differences in various pain experiences (39). These experiences have different meanings which are linked to many aspects of culture, cuisine, language (60;61) and tradition (39). Various types of pains occurring in different areas of the body at different times in different locations all carry with them so many types of associations. These pains may be associated to physical, emotional, social, spiritual, dietary, and climatic influences. Thus, the Western model of pain as merely a physical incident may be inappropriate. Definitions on how "abnormal" pain is perceived which requires attention or treatment varies, and is also culturally defined (39).

Smoking and the Experience of Serious Economic Problems *Associated with Musculoskeletal Pain*

This study has found significant association between musculoskeletal pain and the experience serious economic problems and smoking between the five immigrant groups. Similar findings have been found earlier (17;97-99) associating musculoskeletal pain with smoking and those with lower socio economic status.

A study in Norway among people age 16-66 reported that smokers and ex-smokers had multiple pain sites compared to those who never smoke (100). The associations found were still high even after sex, age, mental distress, and physical demands from work were adjusted. In addition, the effects of

[12] Wrong-doing or misbehavior
[13] i.e. pre-existing assumptions (to oneself or from others): as justice, suffering, misfortune, punishment, responsibility, as a consequence and guilt (62).

chemicals (i.e. nicotine) from tobacco smoking may cause damage to musculoskeletal tissues though vasoconstriction, hypoxia or other mechanisms which decrease nutrition supply to the tissue structures (98). Limited papers have looked at the association between smoking and musculoskeletal pain and compared this association between different ethnic groups. Since the effect of smoking tobacco on the body is patho-physiological (101), this finding may apply to any ethnic group.

Social inequalities have been found in both frequency and severity of several common symptoms in Sweden (102). The results of the Swedish study led to the hypothesis of “double suffering”, also argued by Eachus (103) describing lower classes to have more health problems and experience these problems with greater intensity. Their helplessness or limited resources to cope with the outcome of the disease also contribute to their suffering. Thus, the findings of this study also support the Swedish hypothesis.

The association of Pain to Physical Activity and Visits to a Primary Doctor

In this study, physical activity was not associated with MSMP. Studies evaluating the association between chronic musculoskeletal complaints and physical exercise have shown conflicting results. Literatures suggest the ill effects of physical inactivity (27;104). It causes several abnormal physiological and physical (i.e. increased heart rate, overweight or obesity and widespread musculoskeletal complaints) conditions (27). Nonetheless, having no statistical significance may not necessarily mean that PA has no significant physiological and physical effects in the body.

In addition, literatures suggest that the physiological importance or significance of PA, in reducing the risk of coronary artery disease (CAD), obesity (104), musculoskeletal complaints (27;105) and other associated morbidity is considerable. Inversely, agreeing to the result of this survey, a study in the Netherlands (106) found no strong correlation between musculoskeletal complaints and physical activity. Likewise no association

was found between musculoskeletal complaints and physical activity among the adolescents in Denmark (107).

The number of visits to a primary doctor in this study is not associated with MSMP. Consultation patterns alone without knowing the reasons behind these consultations do not give us any clear clarification. Hence, the increase in the consultation may not necessarily concern musculoskeletal complaints (MSP).

In contrast, Macfarlane et al. studied the influence of psychological symptoms and mental health disorders on health seeking behavior. They found that 25% of consulters with chronic widespread pain have mental disorders (43). They argue that patients with pain are more likely to go to the doctor and to be not working due to ill health. Therefore, considering a comprehensive screening and treatment approach to pain was their recommendation. This may contribute to the alleviation of symptoms especially to patients with chronic widespread pain.

Furthermore, a review of literature by Njobvu et al. found that adult Asians in Britain see their primary doctors more frequently compared to Europeans (7). They noted that Pakistani men age 16-44 see their primary doctors twice as often as they see the European men. Higher rates of consultation are also apparent among Pakistani women in the same age group to European women. However, the findings are not clear whether the true difference in morbidity or differences in perception of illness cause the greater utilization of health care services.

4.1 Strength and Weakness

The differences between the five immigrant groups and the significant association between pain and psychological distress must be treated with caution. There was a lot of missing data. Thus, lowering the number of subjects in many of the groups and resulting to wider confidence intervals.

The weakness of this study is in its methodology that is a cross-sectional design (108). This study merely shows the association of our main independent variable (psychological distress) to the dependent variable (MSP).

Another weakness is the lack of illustration in questions regarding musculoskeletal pain. It would have been much clearer and easier to understand if a human figure was illustrated next to the pain questions like the McGill-Melzack Pain Questionnaire (2), which measures the three dimensions of pain (sensory, affective and evaluative) and includes the visual analog scale.

In addition, the questions for pain in this study refer only in the course of the "last 4 weeks". Magee describes sub-acute pain existing from 10 days to 7 weeks and chronic pain for more than 7 weeks (2). Santos et al., define chronic pain as "existing or lasting for at least 3 months" which is associated to psychological distress in other studies (30;43;45;51;78;96). According to these definitions, chronic pain may not be adequately measured or represented in this study. However, results from a prospective study in Norway found that even persons with no musculoskeletal pain are still at a constant risk of developing pain if they experience psychological distress (82).

This study is concerned with different ethnic groups. The questionnaires used for musculoskeletal pain and psychological distress have not been specifically validated among the immigrants (in the host country). Most of the scientific methodologies and questionnaires are developed by western minds. These may not be applicable to other ethnic groups and/or interpreted

in the same way by other cultures. Since there is no gold standard in measuring health, we do not have any reason to believe that cultural factors bias the results of our finding for this reason.

Knowing that pain is a subjective experience, we can only assume that there may be differences (maybe difficulty) in the understanding and interpretation of pain questions by the studied groups. In addition, the results collected from self-reported data must be treated with caution, which often gives questions about its validity. However, self-reported health and related psychosocial factors have been used in western studies (109-112).

Another methodological weakness of this study is the low participation rate of the responders and the high rate of missing data among responders. Epidemiological studies with a low participation rate may jeopardize the validity of the results due to the likelihood of selective participation (113). Nonetheless, even a high response rate does not prevent selection bias (114).

The attendance of this study is within the range of other population-based surveys and therefore, self-selection had little influence on prevalence estimates of this study (115). With the low response rate of the younger age groups, there might be some effect on the high distress scores in this study, since anxiety and depression goes with age. In addition, similar issues go with musculoskeletal conditions (pain) that increase with age. However, there may be a possible over estimation of ORs in the results of this study.

The results of this study will enable us to provide better estimates of the prevalence of chronic conditions like musculoskeletal pain. Following the same design and methods used in the HUBRO provides the possibility of making comparisons between the immigrants and the ethnic Norwegian population. These comparisons will provide a better understanding of the immigrants' health status when it comes to chronic pain.

5

Conclusion/Recommendations

This study provided additional knowledge concerning the immigrant population in Norway. The aim to identify the prevalence and differences in musculoskeletal pain between the five immigrant groups was fulfilled. Factors (i.e. gender, age, etc.) and psychological distress as important predictors for MSP (MSMP) among the five-immigrant populations were also identified. In addition, this study demonstrated the strong association of psychological distress to musculoskeletal pain. That is the main objective of this study. Hypothetical conclusions (i.e. Immigrants in Norway experience more musculoskeletal disorders than the native Norwegians.) cannot be made from the results of this study and should be tested further with longitudinal studies. Qualitative studies are also needed. This will provide better knowledge regarding the differences in the perceptions and understanding of pain among the immigrant populations.

Knowing the prevalence estimates of the chronic diseases will be the key to better addressing the health needs and priorities relevant within the immigrant population in Norway. This study suggests that attentions to

cultural factors in diverse clinical populations are essential if treatment programs are to succeed in addressing chronic conditions. Attention should be given when working with recent immigrants and/or first generation immigrants that may be less likely to assimilate into Norwegian culture. Patients from other ethnic or cultural groups may have a strong adherence to their own traditions. They may not give the same meaning or interpretation of 'health' like the ethnic Norwegians. Health care providers should consider ethnic background in assessing pain (reporting behaviour, standards, beliefs etc.), which is a subjective experience. However, attention should be placed on the importance of the individual experience and not the labelling of an individual with their ethnicity. Our differences culturally can be the key to better understanding our pain. This may also be of importance in the assessment and better management of our health concerns that we cannot ignore.

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